

WHAT IS CLAIMED IS:

1. A solid-state imaging device, comprising:

at least one pixel section; and

a control section for controlling an operation of the at least one pixel section;

wherein:

the at least one pixel section includes:

a light receiving section for outputting charges by performing photo-electric conversion of light incident thereon, and

a transistor section having a charge accumulation region for accumulating the charges output by the light receiving section;

the transistor section outputs an output signal representing a voltage value corresponding to an amount of charges accumulated in the charge accumulation region; and

the control section, for resetting the charges accumulated in the charge accumulation region after the output signal is output from the transistor section, injects charges into the charge accumulation region before discharging the accumulated charges from the charge accumulation region.

2. A solid-state imaging device according to claim 1, further comprising a substrate, wherein:

the transistor section further includes a gate electrode, a source electrode, and a drain electrode; and

the control section injects the charges into the charge accumulation region from the substrate by applying a first gate voltage to the gate electrode.

3. A solid-state imaging device according to claim 2, wherein:

the control section discharges the accumulated charges from the charge accumulation region by applying a second gate voltage to the gate electrode, and

the second gate voltage has a value which causes a prescribed amount of charges to remain in the charge accumulation region.

4. A solid-state imaging device according to claim 2, wherein the control section accumulates the charges output from the light receiving section in the charge accumulation region by applying a third gate voltage to the gate electrode.

5. A solid-state imaging device according to claim 2, wherein the control section outputs the output signal from the transistor section by applying a fourth gate voltage to the gate electrode.

6. A solid-state imaging device according to claim 4, wherein a value of a potential barrier between the substrate and the charge accumulation region when the first gate voltage is applied to the gate electrode is smaller than a value of the potential barrier between the substrate and the charge accumulation region when the third gate voltage is applied to the gate electrode.

7. A solid-state imaging device according to claim 3, wherein a value of the second gate voltage is obtained by shifting a gate voltage value necessary to completely discharge the charges accumulated in the charge accumulation region in a direction causing the prescribed amount of charges to remain in the charge accumulation region.

8. A solid-state imaging device according to claim 1, including a plurality of pixel sections which are arranged in a matrix.

9. A solid-state imaging device according to claim 4, including a plurality of pixel sections, wherein:

the control section applies the third gate voltage to a gate electrode included in at least one unselected pixel section among the plurality of pixel sections, and

a value of the third gate voltage prevents charges from being injected from the substrate into the charge accumulation region.

10. A solid-state imaging device according to claim 1, wherein:

the at least one pixel section further includes a substrate including a well region;

the transistor section includes:

an annular gate electrode,

a source electrode surrounded by the gate electrode,

a drain electrode surrounding the gate electrode,

and

a channel region provided at a position which is in the well region and below the gate electrode;

the charge accumulation region is provided at a position which is in the well region and below the channel

region, so as to surround the source electrode, and
the transistor section is connected to the light
receiving section via the well region.

11. A method for driving a solid-state imaging device,
the solid-state imaging device including:

at least one pixel section; and

a control section for controlling an operation of
the at least one pixel section;

wherein:

the at least one pixel section includes:

a light receiving section for outputting charges
by performing photo-electric conversion of light incident
thereon, and

a transistor section having a charge accumulation
region for accumulating the charges output by the light
receiving section,

the method comprising the steps of:

outputting an output signal from the transistor
section, the output signal representing a voltage value
corresponding to an amount of charges accumulated in the
charge accumulation region, and

for resetting the charges accumulated in the charge
accumulation region after the output signal is output from

the transistor section, injecting charges into the charge accumulation region before discharging the accumulated charges from the charge accumulation region.

12. A method according to claim 10, wherein the at least one pixel includes a substrate, and the transistor section further includes a gate electrode, a source electrode, and a drain electrode;

wherein the step of injecting includes the step of injecting charges from the substrate into the charge accumulation region by applying a first gate voltage to the gate electrode.

13. A method according to claim 12, further comprising the step of discharging the accumulated charges from the charge accumulation region by applying a second gate voltage to the gate electrode,

wherein the second gate voltage has a value which causes a prescribed amount of charges to remain in the charge accumulation region.

14. A method according to claim 12, further comprising the step of accumulating the charges output from the light receiving section in the charge accumulation region by

applying a third gate voltage to the gate electrode.

15. A method according to claim 12, wherein the step of outputting the output signal includes the step of applying a fourth gate voltage to the gate electrode.